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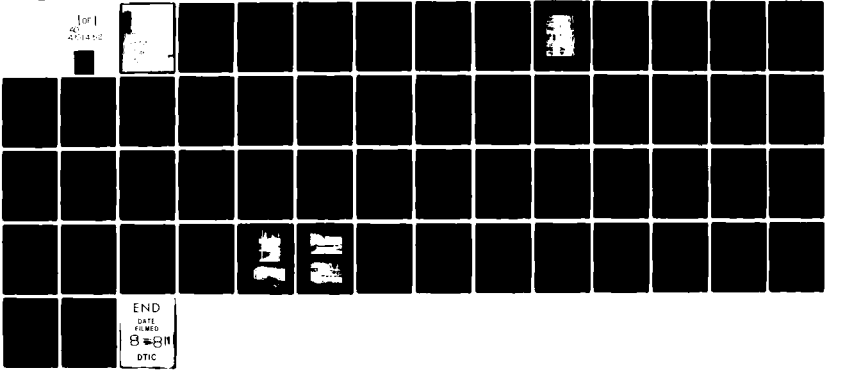

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Visual Inspection
Structural Analysis
National Dam Safety Program
Skellinger Dam, New Jersey
Erosion

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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4/10/82 SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

30 JUN 1981

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Skellinger Dam, Sussex County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Skellinger Dam, initially listed as a high hazard potential structure but reduced to a low hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. The low hazard potential classification means that in the event of failure of the dam, no loss of life and only minimal economic loss is expected. For the same reasons no further studies or increase of spillway capacity are recommended. However, to assure the continued functioning of the dam and its impoundment, the following remedial actions could be undertaken by the owner:

a. Clear the brush and trees from the embankment and the upstream face of the dam.

b. Fill, grade, and reseed the eroded area at the junction of the dam crest and left wingwall of the spillway.

c. Inspect and repoint the masonry sidewalls of the spillway and channel where necessary.

d. Inspect, repair, and test the valve for the outlet conduit located in the center of the dam.

e. Clean the road culvert that drains the swale between the road and the dam and install a screen at the entrance to the pipe.

f. Periodi inspection and repair, when necessary, of the appurtenant structures desc ibed above should be included in the maintenance program.

g. The bl w-off valve should be opened periodically to ensure its proper functior ıg and to keep the intake area free of excessive siltation.

h. The op ıtors of the dam should release water through the blow-off valve in anticipatıon of, or during, severe storms and excessive runoff.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

for Kenneth R Moser Maj CE DOE
JAMES G. TON
Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:
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Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
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SKELLINGER DAM (NJ00020)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 16 January and 5 February 1981 by Louis Berger and Associates, Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Skellinger Dam, initially listed as a high hazard potential structure but reduced to a low hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. The low hazard potential classification means that in the event of failure of the dam, no loss of life and only minimal economic loss is expected. For the same reasons no further studies or increase of spillway capacity are recommended. However, to assure the continued functioning of the dam and its impoundment, the following remedial actions could be undertaken by the owner:

a. Clear the brush and trees from the embankment and the upstream face of the dam.

b. Fill, grade, and reseed the eroded area at the junction of the dam crest and left wingwall of the spillway.

c. Inspect and repoint the masonry sidewalls of the spillway and channel where necessary.

d. Inspect, repair, and test the valve for the outlet conduit located in the center of the dam.

e. Clean the road culvert that drains the swale between the road and the dam and install a screen at the entrance to the pipe.

f. Periodic inspection and repair, when necessary, of the appurtenant structures described above should be included in the maintenance program.

g. The blow-off valve should be opened periodically to ensure its proper functioning and to keep the intake area free of excessive siltation.

h. The operators of the dam should release water through the blow-off valve in anticipation of, or during, severe storms and excessive runoff.

APPROVED: Kenneth R Mertz Maj CE DE
for JAMES G. TON
Colonel, Corps of Engineers
Commander and District Engineer

DATE: 30 June 1981

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam Skellinger Dam Fed ID# NJ 00020

State Located	New Jersey
County Located	Sussex
Coordinates	Lat. 4113.7 - Long. 7445.1
Stream	Spring Cabin Brook
Date of Inspection	January 16 and February 5, 1981

ASSESSMENT OF GENERAL CONDITIONS

Skellinger Dam is considered to be in a generally good condition and has a spillway capacity adequate to accommodate the 100-year design flood. It is recommended that its hazard classification be downgraded to low since it is unlikely that a failure would result in loss of life or serious property damage. Although no detrimental findings warranting further study were uncovered, it is recommended that the following remedial actions be undertaken to ensure the continued functioning of the dam and its impoundment: 1) Repair of the eroded areas and removal of the vegetation from the embankment, 2) Regrouting and repointing of the masonry pavement and sidewalls, 3) Inspection and repair of the drain's gate valve, and 4) Removal of debris from the swale draining culvert.

Abraham Perera P.E.
Project Manager

OVERVIEW OF SKELLINGER DAM

MARCH, 1981

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines can be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of Phase I investigations is to identify expeditiously those dams that may pose hazards to human life or property. The assessment of the general condition of the dam is based on available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is in tended to identify any need for such studies.

In the review of this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway test flood is based on the estimated "probable maximum flood" for the region (greatest reasonable possible storm runoff) or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM
NAME OF DAM: SKELLINGER DAM FED #NJ 00020
AND NJ ID# 22-113

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with Contract FPM-36 between Louis Berger & Associates, Inc. and the State of New Jersey and its Department of Environmental Protection, Division of Water Resources. The State, in turn, is under agreement with the U.S. Army Engineer District, Philadelphia to have this inspection performed.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Skellinger Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Skellinger Dam is a 340-foot-long earth structure with a concrete, ogee spillway located at the right abutment. The embankment, which has a maximum height of 16 feet, has a crest width of 8 feet, 2.5H:1V sideslopes and is zoned into three distinct sections. The upstream portion of the embankment is covered with select hand-placed stone between elevations 96 and 102. The fill consists of compacted impervious fine material. The center portion of the embankment consists of an impermeable rolled clay core and cutoff trench. The downstream portion of the embankment is composed of a heavier, coarser material with rock fill at the toe of the slope. The spillway varies slightly in width from 31 to 33.7 feet and has concrete sidewalls extending 15.5 feet and 21 feet upstream and downstream respectively. The flat spillway approach channel is 3.5 feet deep and riprap lined. The trapezoidal downstream channel is 35 feet wide, riprap lined,

and has masonry sidewalls and a variable slope. A 24-inch-diameter corrugated iron drain is located in the center of the dam at invert elevation 87. The bituminous coated drain is encased in 6 inches of reinforced concrete and has concrete headwalls at both ends. A reinforced concrete valve chamber is located in the center of the dam with access provided by a square grate-covered manhole located on the dam's crest. A trash screen covers the entrance to the drain pipe. Skellinger Road extends along the toe of the dam and may be considered part of the structure because the downstream slope of the road embankment is quite long and appears to be a continuation of the dam.

b. Location

Skellinger Dam, which is also known as Lake Wapalanne Dam, is situated on Spring Cabin Brook about 600 feet south of its confluence with Big Flat Brook. Skellinger Road extends along the toe of the downstream embankment of the dam, which is located approximately 5,500 feet east of the intersection of Skellinger and Flat Brook roads in Stokes State Forest, Sandyston Township, Sussex County, New Jersey.

c. Size Classification

The Skellinger Dam has a maximum height of 16 feet and a maximum storage capacity of 133 acre-feet. Accordingly, this dam is in the small size category as defined by the criteria in the Recommended Guidelines for Safety Inspection of Dams (storage less than 1,000 acre-feet and height less than 40 feet).

d. Hazard Classification

The downstream channel between the dam and Big Flat Brook is undeveloped woodland. While there are campsites downstream, they are generally located several hundred feet from the river and above flood elevations. Although it is possible that personal injury could result from a dam failure, the possibilities are remote due to the isolation of the area. While Skellinger Road extends along the toe of the dam it is felt that little damage would occur to the road in the event of a dam failure. Accordingly, it is recommended that the dam be placed in the low hazard category.

e. Ownership

The dam is owned by the State of New Jersey, Department of Environmental Protection, Bureau of Parks, P.O. Box 1420, Trenton, New Jersey, 08625.

f. Purpose of Dam

The dam was originally constructed for recreational purposes. At present the lake is used for classes in conservation and environmental studies.

g. Design and Construction History

The dam was designed by the State Department of Conservation and Development, Division of Forests and Parks in 1934 and the plans were revised in 1935. Construction, which was performed by the Civilian Conservation Corps (CCC), began in 1936 and was completed in December 1937. In March 1938, the sluice gate was closed and the lake allowed to fill. In April 1938, the construction was inspected and approved by the State Water Policy Commissions personnel. In 1940, a decision was reached by the Division of Forest & Parks to increase the elevation of the dam by 3 feet. New plans were prepared by the Department of Conservation & Development in conjunction with the USDA-CCC. Reconstruction began in May 1941 and was completed in July 1942. Final approval and acceptance was granted in August 1942.

h. Normal Operating Procedures

While the dam is owned by the State of New Jersey, much of the care and maintenance of the property is performed by the New Jersey School of Conservation, which is located alongside the lake near the dam. The school has a full-time teaching and maintenance staff living on the property. In addition to their normal duties, the maintenance staff performs routine groundkeeping and light maintenance at the damsite, although none of the staff has specific training in the care and opertion of dams. There are no operational procedures in effect with respect to the regulation of the lake level. While there are no formal monitoring or warning systems in effect, the nature of the studies at and around the lake guarantee constant, albeit informal, surveillance of the dam. Moreover, the area is routinely patrolled by forest rangers trained specifically in disaster control.

1.3 PERTINENT DATA

a. Drainage Area

Skellinger Dam has a drainage area of 1.7 square miles that consists of an undeveloped, heavily forested mountainous region.

b. Total spillway capacity at maximum pool elevation - 998 cfs

c. Elevations (Assumed Datum)

Top of dam	-	103.0
Principal spillway crest	-	99.0
Streambed at centerline of dam	-	87.0

d. Reservoir

Length of maximum pool (top of Dam)	-	2,250 feet
Length of recreation pool (principal spillway crest)	-	1,800 feet

e. Storage (acre-feet)

Top of dam	-	133
Recreation pool	-	37

f. Reservoir Surface (acres)

Top of dam	-	32.6
Recreation pool	-	12.9

g. Dam

Type - Earth embankment with concrete ogee at right abutment

Length - 340 feet

Height - 16 feet

Top width - 8 feet

Side slopes - 2.5H:1V

Zoning - 3 zones: Fine, impervious compacted material in upstream embankment; impervious clay core; coarse material in down stream embankment

Impervious blanket - None

Core - Impervious clay core 2 feet wide at crest and 10 feet wide at base of dam

Cutoff - 10-foot wide clay cutoff contiguous with core and extending to variable depths

Grout curtain - None

h. Diversion and Regulating Tunnel

Type - None

i. Spillway

Type - Concrete ogee weir at right abutment

Weir length - 31 feet at weir crest to 33.7 feet at dam crest

Gates - None

U/S channel - Flat riprapped approach channel 16 feet long with concrete sidewalls

D/S channel - Variably sloping concrete spillway apron and riprapped trapezoidal channel with masonry sidewalls

j. Regulating Outlets

The gate operated, low-level drain consists of a 24-inch-diameter, bituminous-coated corrugated iron pipe completely encased by 6 inches of reinforced concrete. Located in the center of the dam at invert elevation 87, the drain has reinforced concrete headwalls at both ends and an upstream trash screen.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Details of the initial design, hydraulic determinations, structural analyses, and subsurface information were available for review by the inspection team together with as-built plans and the various modifications undertaken since the initial construction. All design was performed by the State Department of Conservation and Development in conjunction with the CCC.

2.2 CONSTRUCTION

The original construction of Skellinger Dam and the 1940 modifications were performed by the CCC under the supervision of the State Division of Parks and Forests. The dam was constructed as designed in 1934/36 and later modified. Pre-design subsurface investigations indicated that the overburden on which the dam was constructed consists of stratified glacial sediments and recent alluvium. In general, the soil profile consists of sandy gravel or clayey gravel overlain by an impervious clay layer that, in turn, is overlain by a thick layer of loam or sandy loam. The depth of the core wall was determined by the subsurface conditions as observed during construction. Although not observed during the inspection, bedrock in this area is probably the Silurian High Falls Formation, which consists of alternating beds of hard red sandstone and shale.

2.3 OPERATIONS

General information pertaining to the operations at the dam were obtained from the Director of the State School of Conservation and maintenance personnel at the site. However, no formal codified procedures for regulating the lake level are in effect at this time.

2.4 EVALUATION

a. Availability

Sufficient engineering and construction data were available to evaluate the stability and hydraulic capacity of the dam.

b. Adequacy

The field inspection and review of the available design plans reveal that the dam is structurally sound and well built. It is believed that the data available are adequate to render this assessment without recourse to gathering additional information.

c. Validity

The vailidity of the engineering data available is not challenged and is accepted without recourse to further investigations.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspections of Skellinger Dam (a.k.a. Lake Wapalanne Dam) took place on January 16 and February 5, 1981. The dam appeared to be in good condition with the water level at normal pool elevation and about 1 inch of water flowing over the spillway on both days.

b. Dam

The embankment is a straight, relatively low structure lying between slightly higher abutment zones. The road along the downstream side of the dam stabilizes the toe and reduces the apparent height, as well as the effective height to width ratio, of the dam. The road is paved, is 24 feet wide, and has a drainage swale and culvert on the upstream side that collects and funnels all of the runoff from the downstream side of the dam to the spillway channel. The dam embankment has a very uniform crest and sideslope with a thick grass cover and pine trees spaced evenly along the downstream embankment. Light brush and an occasional small-diameter tree were observed on the upstream slope of the dam. Although almost covered by silt and grass, a uniform, hand-placed layer of riprap was noted along the entire upstream slope. No settlement, sloughing, or cracking were observed although erosion was noted at the junction of the embankment and the spillway's left wingwall. The erosion appears to be the result of pedestrian traffic since it is contiguous with a path extending to the road. Moreover, no erosion was noted next to the right wingwall where the brush is higher and no signs of pedestrian traffic were observed. Several of the small-diameter trees on the downstream embankment have recently been cut down by beavers; however, there were no signs of rodent damage to the embankment.

c. Appurtenant Structures

The principal outlet for the dam is a concrete ogee spillway with masonry sidewalls located near the right abutment. Although the structure exhibited a weathered surface consistent with its age, in general, all of its components appeared structurally

sound and in satisfactory condition. Some minor spalling and cracking were observed in the sidewall mortar, and the overflow slab and apron is developing a weathered pebbley textured surface. However, no significant irregularities or damages were noted, and the structure is performing satisfactorily as designed. It was not possible to observe the intake structure or the valve chamber for the low-level drain since the former was located below the ice and the metal hatch to the valve chamber was locked shut, precluding unauthorized entry or inspection at that time. However, the outlet conduit and concrete headwall on the downstream side of the road embankment were inspected. Both appeared in satisfactory condition, and a light flow of water was observed emanating from the pipe. Because the gate valve has not been operated in many years, it may be assumed that it is leaking and in need of repair. One other component of the dam is the pipe culvert extending from a drainage swale on the upstream side of the road to a discharge channel at the downstream toe of the road embankment. While the conduit appears to be functioning adequately, its entrance is almost entirely grown over and the pipe is half-filled with silt and leaves.

d. Reservoir Area

The drainage area of this impoundment is a part of Stokes State Forest and, as such, is undeveloped and protected. There are approximately 30 buildings surrounding the lake that belong to the School of Conservation. The remainder of the area is forested and has moderate to steep slopes. The lake is apparently beginning to undergo advanced stages of siltation and, according to the school's director, eutrophication is becoming a major problem at the lake. The lake was completely frozen over at the time of the inspection, which prevented observing the problem firsthand.

e. Downstream Channel

The spillway discharges into a masonry lined and walled, trapezoidal channel. The first 15 feet of the channel contain a stone masonry pavement embedded in a 12-inch-thick concrete mat. A vertical concrete cutoff wall with two 4-inch-diameter drains is contiguous with the pavement mat. From the cutoff wall to the road bridge about 30 feet downstream, the channel is paved with large stone at least 12 inches thick. Although the masonry pavement is in need of regrouting, the stone

appears stable and the channel appears to be in satisfactory condition. Some light debris, consisting of brush and branches, has accumulated just below the outfall slab. The channel joins Big Flat Brook about 800 feet downstream of the dam. The downstream area is essentially uninhabited, although there is a picnic/camping area near Lake Ocquittunk about 1 mile downstream.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Skellinger Dam impounds a lake that is used primarily for environmental studies and recreation. While there is a full time, 5-man maintenance crew employed at the school, its duties are consonant with the primary purpose of the school and do not specifically include formal or routine operations at the dam. Communication with the school's director reveals that, to the best of his knowledge, the gate valve has not been opened during his tenure at the school, which has been approximately eighteen years.

4.2 MAINTENANCE OF DAM

Maintenance of the dam is limited to groundkeeping and light repair work on an "as-needed" basis. Although the dam receives no special attention, it is maintained as an integral part of the maintenance crew's routine duties. While it is not trained specifically in dam maintenance, the staff appears to perform this work in a careful, conscientious manner, the evidence of which is the well-tended appearance of the structure and signs of recent concrete repointing of portions of the channel walls. However, removal of trees from the embankment should be included in the maintenance procedures at the dam.

4.3 MAINTENANCE OF OPERATING FACILITIES

As indicated in paragraph 4.1, the staff at the school has not operated the gate valve in many years. Consequently, there has been no incentive to inspect or maintain this component of the dam. As indicated in paragraph 3.1 c, the valve is apparently leaking and in need of inspection and repair.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No formal warning system exists at the dam. However, maintenance personnel work in its vicinity on a daily basis and members of the school staff reside close by. Additionally, the area is routinely patrolled by forest rangers trained in disaster control.

4.5 EVALUATION

The dam is well monitored and maintenance, although informal, is considered good. While there is no need for water level regulation in conjunction with the school's activities, the gate valve and drain should be functional for emergency situations. Since the condition of the valve is unknown, this component should be inspected, tested, and repaired if necessary. A regular maintenance program for the dam and its appurtenances should be implemented, and the drain should be opened on a regular periodic basis to ensure its continuing operability.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data

Pursuant to the Recommended Guidelines for Safety Inspection of Dams, Skellinger Lake Dam is a small size and low hazard dam. Accordingly, the 100-year frequency storm was chosen as the design flood by the inspecting engineers. The peak discharge from the reservoir for the selected 100-year storm was calculated by the methodology set forth in Special Report #38, Magnitude and Frequency of Floods in New Jersey with Effects of Urbanization by the NJDEP & the US Department of the Interior, Geological Survey. This resulted in a flow of 739 cfs. Since the dam spillway capacity is 998 cfs, the spillway can accommodate 135% of the 100-year flood. Flow discharges for the downstream bridge culvert were also made in order to investigate the tailwater effect of the bridge on the dam spillway. It was determined that the spillway flow would not be affected by tailwater.

b. Experience Data

None available. The spillway appears to have functioned satisfactorily through the years, and according to the owners, the dam has never been overtopped.

c. Visual Observation

The 31-foot-wide ogee spillway appears to have accommodated the flood flows in the past without causing damage to the banks of the downstream channel.

d. Overtopping Potential

Employing the discharge and spillway capacities contained herein, no overtopping would occur during a 100-year frequency storm. There are no records or indications that the dam has ever been overtopped, nor does there appear to be a significant potential for serious damage as a result of overtopping. It should be noted that during the 100-year flood flow, the bridge deck of the roadway will be overtopped by approximately 9 inches. However this overtopping will not affect the

spillway capacity. The roadway pavement appeared to be in good condition and capable of withstanding moderate overtopping without causing erosion and affecting the dam.

e. Drawdown

The 24 inch diameter CMP outlet pipe is controlled by a gate with access in the chamber atop the dam and is capable of drawing down the lake to elevation 87.5 in 16 hours if operable.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

No deficiencies of a structural nature were noted during the inspection of this dam. The horizontal alignment of the dam crest is good, and both upstream and downstream slopes are uniform and at true design grade. No indication of material movement such as settling, sloughing, or creeping was observed, and the spatial relationship of the spillway and its channel with the dam crest is as indicated on the revised design plans. Water was flowing uniformly over the entire weir, indicating the symmetry and continuing stability of that structure.

b. Design and Construction Data

A review of the design criteria, including hydraulic analysis, subsurface investigations, and material selection for the initial construction and later modification, indicates that the design is well-engineered, reflecting a conservative approach and employing contemporary analytical techniques. Based on the present condition of the dam and a history of uninterrupted satisfactory performance since its construction, it is believed that additional studies or investigations relative to the stability of this structure are unnecessary at this time.

c. Operating Records

The performance of this structure has been satisfactory since its completion. However, there are no formal operating records available.

d. Post Construction Changes

There has been one major modification since the construction of this dam was completed. When the lake was filled following construction, it was observed that the depth of the lake was shallower than desired and that siltation or plant growth in the lake could become a problem in the near future. A suggestion was presented to dredge the lake bottom, but it was decided that dredging would destroy the impervious clay layer blanketing the lake's bottom. Accordingly, a decision was reached to raise the dam's crest and spillway elevations by

3 feet and 2 feet, respectively. The dam and spillway were redesigned incorporating the proposed changes, and final construction of the modifications were completed in 1942. The new design provided for an additional foot of freeboard and decreased the slopes of the embankment from 2H:1V to 2.5H:1V. In addition, the road became an integral part of the downstream slope, further stabilizing the embankment. In general, the 1940 modifications were of a more conservative design than the original, and they enhanced the dam's structural stability while increasing its hydraulic capacity.

e. Seismic Stability

Skellinger Dam is located in Seismic Zone 1, in which seismic activity is slight and additional structural loading imparted thereby is generally insignificant. Experience indicates that earthen dams in Zone 1 that are stable under static loading conditions will maintain their structural integrity when subjected to the negligible dynamic loads imposed by the weak seismicity characteristic of this area. As indicated in the preceding paragraphs, this dam is considered stable under the existing static loading conditions.

SECTION 7 - ASSESSMENTS/RECOMMENDATIONS/ REMEDIAL ACTIONS

7.1 DAM ASSESSMENT

a. Safety

Subject to the inherent limitations of the Phase I visual inspection, Skellinger Dam is considered to be in a good overall structural condition. The spillway capacity is adequate to accommodate the 100-year frequency design flood. It is recommended that the dam be placed in the low hazard category since the downstream area is essentially undeveloped and uninhabited.

b. Adequacy of Information

The design information made available by the NJDEP is deemed to be adequate regarding the analyses and evaluation of safe operation and structural stability.

c. Urgency

While no urgency is attached to the findings contained herein, it is recommended that the remedial measures described in paragraph 7.2 be undertaken sometime in the future to ensure the continuing functioning of the dam and its impoundment.

d. Necessity for Further Study

In view of the overall condition of this dam and the fact that it is continually monitored and maintained by employees of the state, additional inspections or studies within the purview of Public Law 92-367 are deemed to be unnecessary.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

a. Recommendations

Under the present maintenance program, it is recommended that the following be performed in the future:

- Clear the brush and trees from the embankment and the upstream face of the dam.

- Fill, grade, and reseed the eroded area at the junction of the dam crest and left wingwall of the spillway.

- Inspect and repoint the masonry sidewalls of the spillway and channel where necessary.

- Inspect, repair, and test the valve for the outlet conduit located in the center of the dam.

- Clean the road culvert that drains the swale between the road and the dam and install a screen at the entrance to the pipe.

b. O&M Procedures

The present maintenance program is considered satisfactory within the limits of the program. However, periodic inspection and repair, when necessary, of the appurtenant structures described above should be included in the program. It is recommended that the blow-off valve be opened periodically to ensure its proper functioning and to keep the intake area free of excessive siltation. It is further recommended that the operators of the dam release water through the blow-off in anticipation of, or during, severe storms and excessive runoff.

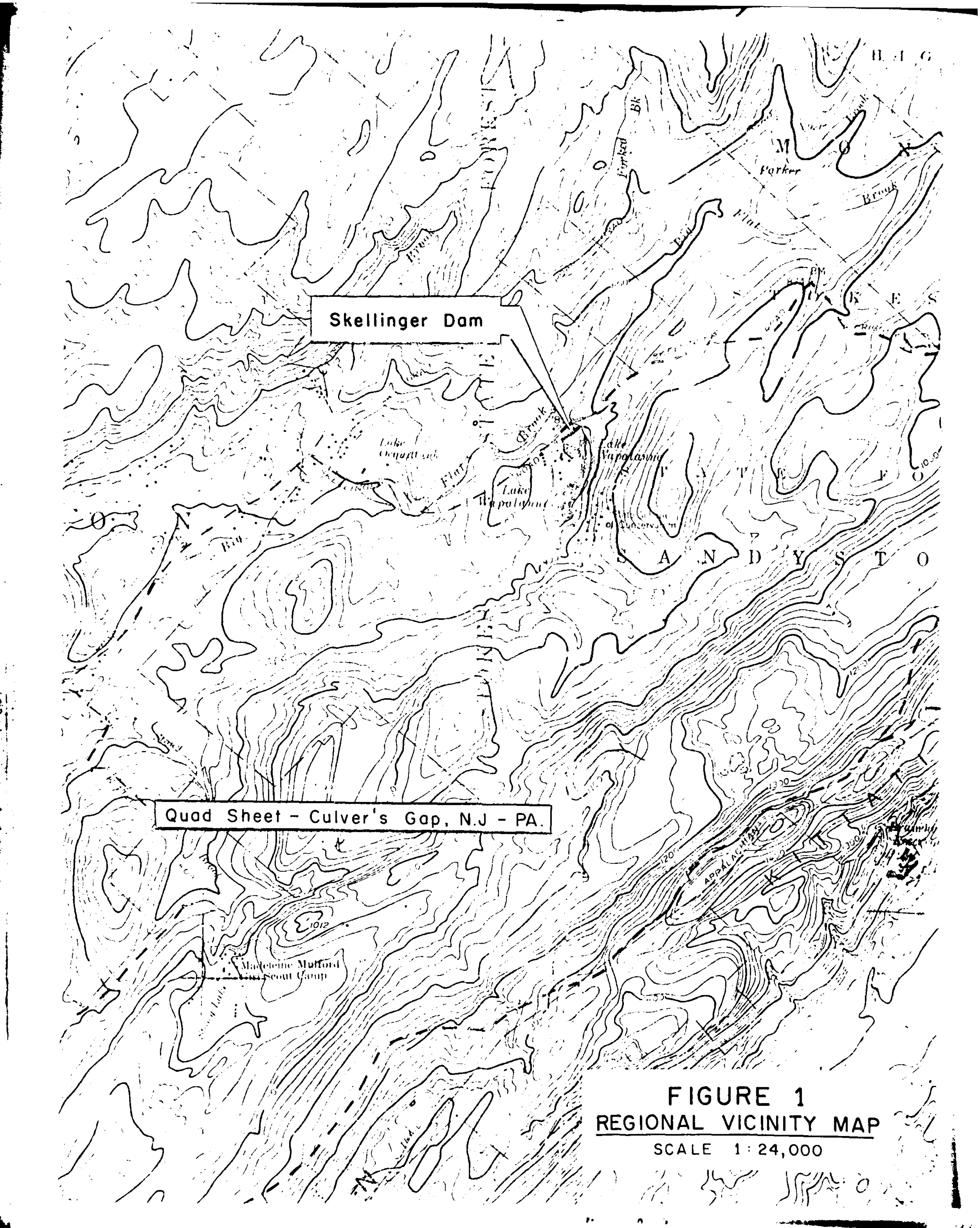
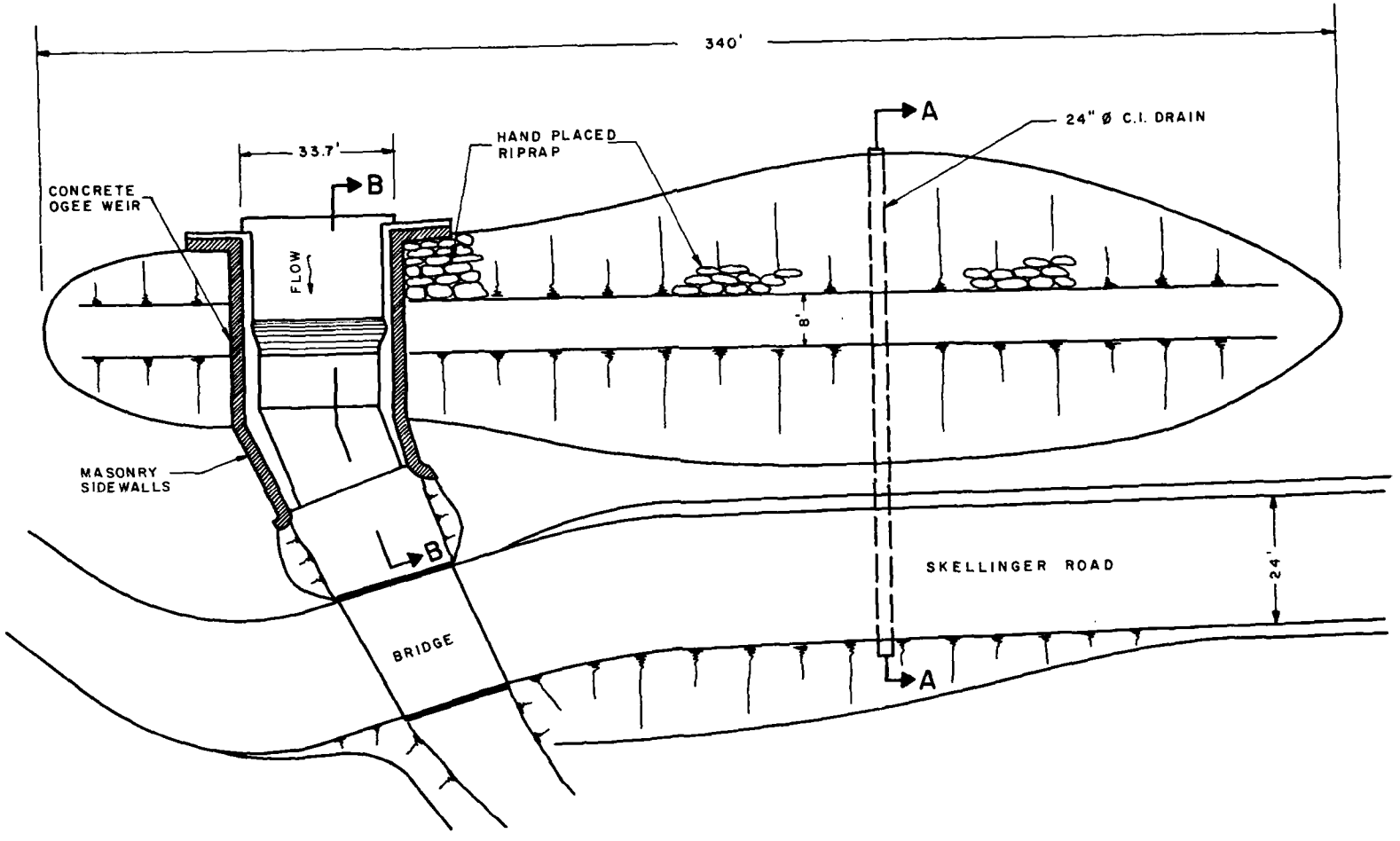


FIGURE 1
REGIONAL VICINITY MAP
SCALE 1:24,000



PLAN OF SKELLINGER DAM

SHOWN SCHEMATICALLY
NOT TO SCALE

FIGURE 2

DAM SECTION A-A AT 24" Ø C.I. DRAIN

NOT TO SCALE

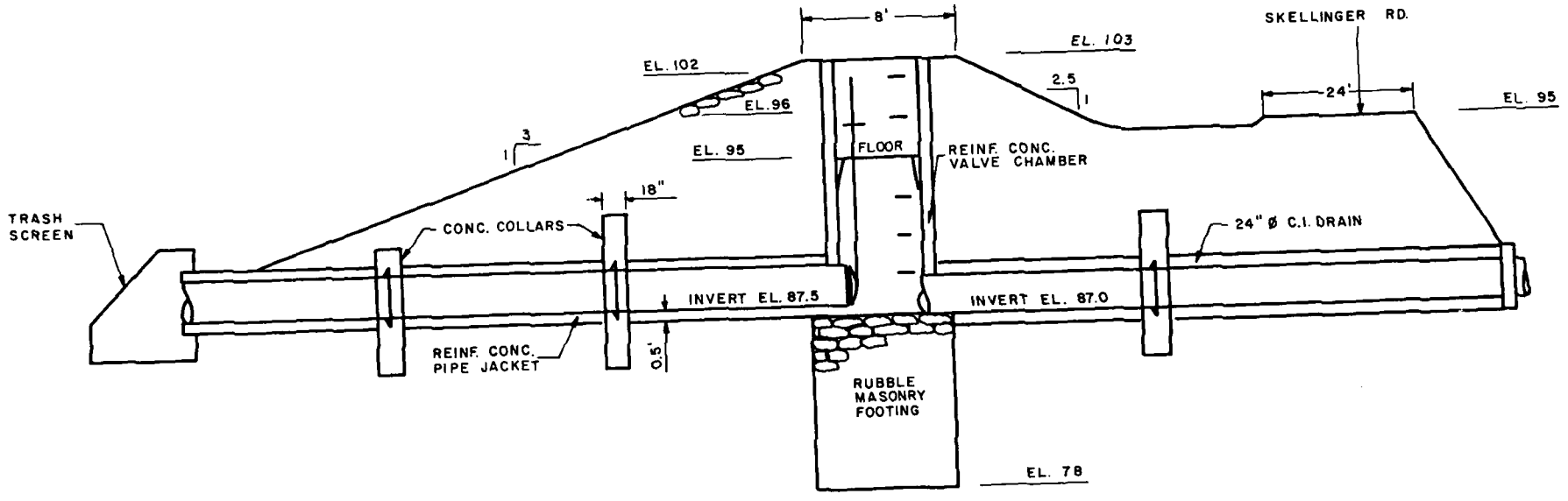
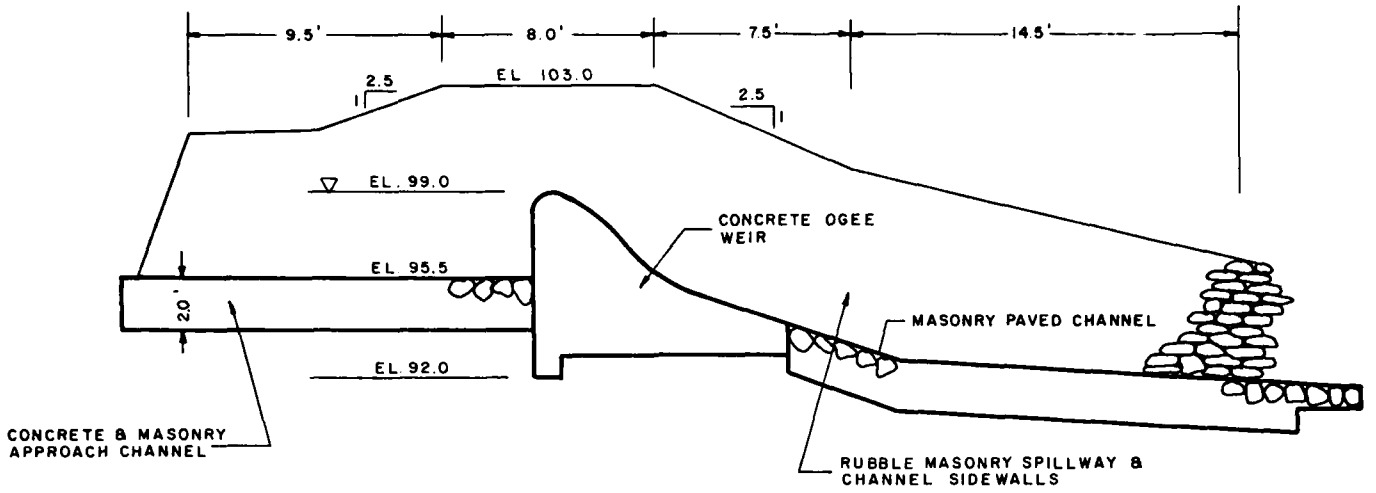
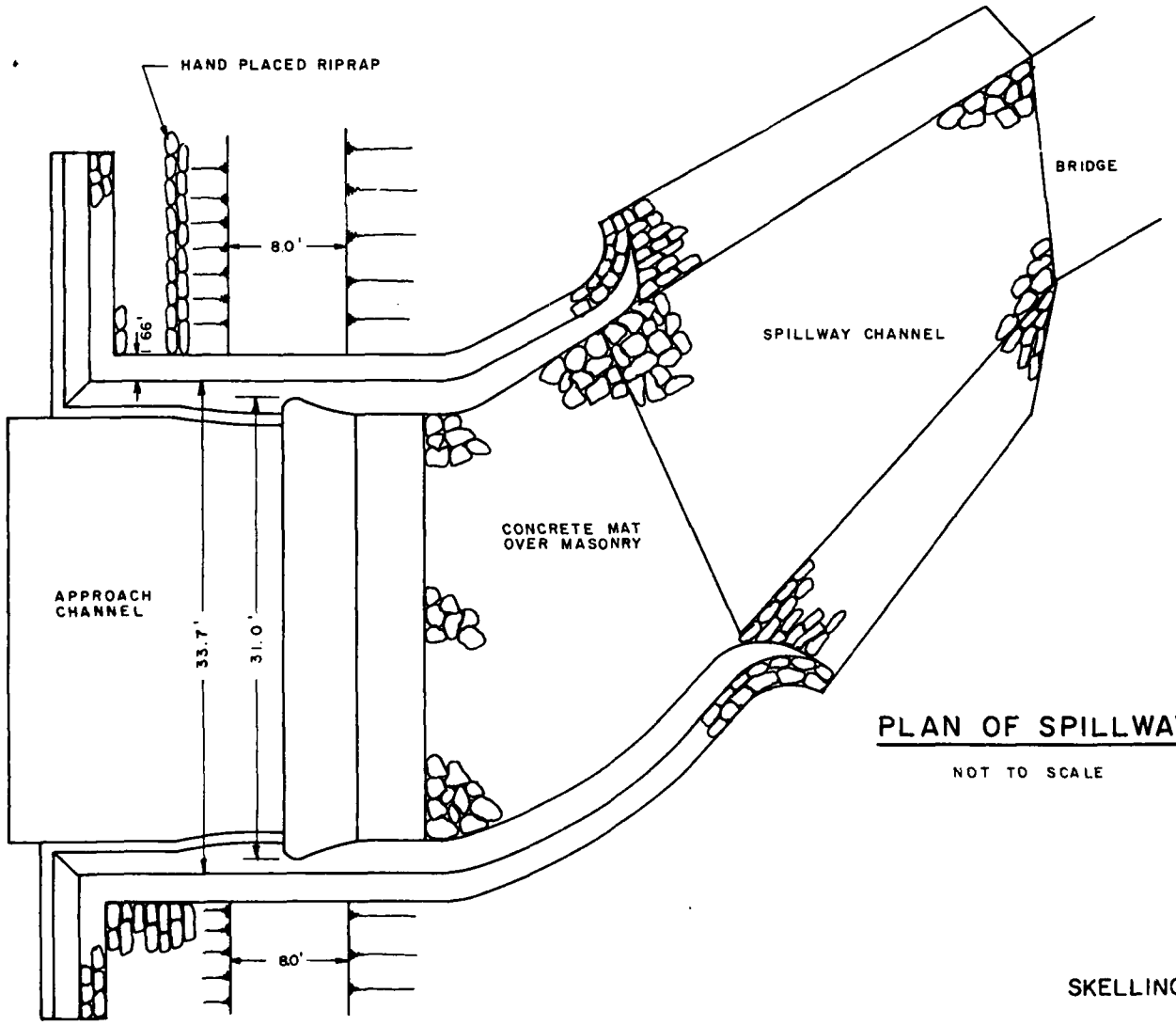


FIGURE 3



SPILLWAY SECTION A-A

NOT TO SCALE



PLAN OF SPILLWAY

NOT TO SCALE

SKELLINGER DAM

FIGURE 4

Check List
Visual Inspection
Phase 1

Name Dam Skellinger Dam County Sussex State New Jersey Coordinators NJDEP

Date(s) Inspection Jan. 16, 1981
Feb. 5, 1981 Weather Overcast Temperature 20°F

Pool Elevation at Time of Inspection 99± A.D. Tailwater at Time of Inspection 87± A.D.

Inspection Personnel:

T. Chapter J. Ceravolo

A. Perera

J. Greenstein

No representative of owner present.

T. Chapter Recorder

* A.D. - Assumed Datum

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Light erosion at junction of dam crest and spillway structure. Erosion due to foot traffic.	Erosion should be filled, graded, and seeded.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Satisfactory.	Dam has very uniform crest and slope.
RIPRAP FAILURES	None observed.	Riprap almost covered by silt and grass cover. Still appears uniform.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	Light brush and small trees on upstream edge of crest. Larger pine trees (5" diameter) spaced evenly along downstream embankment.	Brush and trees should be removed from crest of embankment.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Embankment grades smoothly into abutments. Some erosion noted at junction of spillway's left sidewall (see previous page).	
ANY NOTICEABLE SEEPAGE	None observed.	
STAFF GAGE AND RECORDER	None.	
DRAINS	A swale and pipe culvert drain surface runoff from dam. Culvert is somewhat restricted by sedimentation. No toe drains.	Culvert should be cleaned and a screen placed at intake. Intake area should then be cleaned periodically.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed. Slight flow from pipe. Light silting in pipe and some iron precipitate noted.	Conduit is steel and exhibits light oxidation. Valve probably needs repair.
INTAKE STRUCTURE	Not observed.	
OUTLET STRUCTURE	Concrete headwall in satisfactory condition.	
OUTLET CHANNEL	Small stream channel flowing directly to the main spillway channel about 100 feet downstream.	No constriction noted.
EMERGENCY GATE	Not observed. Valve chamber locked. Valve appears to be leaking	Valve chamber should be opened, inspected, tested, and repaired if necessary.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	In good condition. Ogee crest with uniform flow. Texture of concrete slightly rough.	Masonry sidewalls slightly weathered with some mortar spalling and cracking. Should be repointed.
APPROACH CHANNEL	Uniform grade with sand and gravel bottom.	
DISCHARGE CHANNEL	Satisfactory condition. Stone paving fairly uniform, but much of mortar has weathered away. Light debris (branches) in the channel.	Stone pavement should be regrouted to insure the paving blocks don't start to move.
BRIDGE AND PIERS	Road bridge located about 30 feet from toe of ogee weir. Clear opening 4.7' x 15.5'. May constrict maximum flood flows.	Invert is 7' below spillway crest elevation. Bridge would be overtopped before tailwater reached elevation of crest.

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Slopes are rather steep to the east due to Kittatinny Mtn., gentler to the north and west. Heavily forested everywhere.	
SEDIMENTATION	Lake is undergoing heavy influx of sediment according to the school's director. Siltation was not readily observable due to ice.	No siltation noted at approach channel to spillway.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Generally clear and unobstructed below bridge. Light brush debris between bridge and dam.	Debris is no problem. Will be washed away by next heavy storm.
SLOPES	Channel slopes average 2H:1V to 3H:1V. Height of slopes variable.	
APPROXIMATE NO. OF HOMES AND POPULATION	Channel joins Big Flat Brook 800 feet downstream. No homes, but a camping area is located about 1 mile downstream.	No hazard to campground from this dam.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	Available from NJDEP, Prospect St., Trenton, New Jersey, 08625
REGIONAL VICINITY MAP	Available-USGS Quadrangle, Culvers Gap, New Jersey
CONSTRUCTION HISTORY	Available-NJDEP
TYPICAL SECTIONS OF DAM	Available-NJDEP
HYDROLOGIC/HYDRAULIC DATA	Available-NJDEP
OUTLETS - PLAN	Available-NJDEP
- DETAILS	Available-NJDEP
-CONSTRAINTS	Not Available
-DISCHARGE RATINGS	Not Available
RAINFALL/RESERVOIR RECORDS	Not Available

ITEM	REMARKS
SPILLWAY PLAN	Available-NJDEP
SECTIONS	Available-NJDEP
DETAILS	Available-NJDEP
OPERATING EQUIPMENT PLANS & DETAILS	Available-NJDEP

ITEM	REMARKS
DESIGN REPORTS	Not Available
GEOLOGY REPORTS	Available-NJDEP and "Rutgers Engineering Soil Survey, Sussex County, New Jersey"
DESIGN COMPUTATIONS	Not Available
HYDROLOGY & HYDRAULICS	Available-NJDEP
DAM STABILITY	Not Available
SEEPAGE STUDIES	Not Available
MATERIALS INVESTIGATIONS	Available-NJDEP
BORING RECORDS	Available-NJDEP
LABORATORY	Not Available
FIELD	Not Available
POST-CONSTRUCTION SURVEYS OF DAM	Not Available
BORROW SOURCES	Not Available

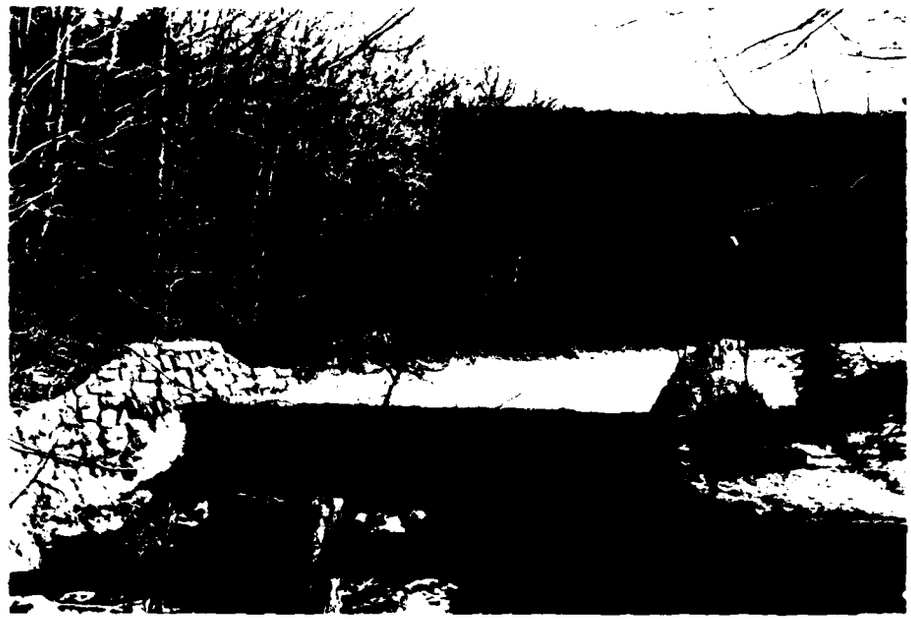
ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Available-NJDEP
HIGH POOL RECORDS	Not Available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Available-NJDEP
PRIOR ACCIDENTS OR FAILURE OF DAM	None
DESCRIPTION	N/A
REPORTS	N/A
MAINTENANCE	No records kept
OPERATION	No records kept
RECORDS	No records kept

March, 1981

View of Dam Crest

March, 1981

View of Road at Toe of Dam



March, 1981

View of Spillway

March, 1981

View of Downstream Bridge and Channel

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.7 sq. mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 99 A.D. (37 ac. ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 103 A.D.(133 ac. ft.)

CREST: Spillway

a. Elevation 99 A.D.
b. Type Concrete ogee weir with trapezoidal shape
c. Width 31 to 33.7 feet
d. Length 9 feet
e. Location Spillover Near right abutment
f. Number and Type of Gates None

OUTLET WORKS: Low-Level Drain

a. Type 24-inch-diameter, steel pipe
b. Location Center of dam
c. Entrance inverts 87.5 A.D.
d. Exit inverts 87 A.D.
e. Emergency draindown facilities Same

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 998 cfs

A.D. - Assumed Datum

BY CERAVOLO DATE 2/27/81 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A1 OF A1

CHKD. BY ____ DATE ____ SKELLINGER LAKE DAM PROJECT CC 276

SUBJECT PEAK FLOW CALCULATION - SPECIAL REPORT #38

A : WATERSHED AREA = 1.7 SQ.MI. = 1088AC

St : SURFACE STORAGE INDEX

AREA SKELLINGER LAKE = 12.9 AC

MISCELLANEOUS LAKES ~ 5 AC

TOTAL $\frac{17.9\ AC}{1088} \times 100 = 1.6\% + 1 = 2.6$

I : % IMPERVIOUS COVER

I = 40 FOR ~ 10 ACRES - N.J. SCHOOL OF CONSERVATION

I = 1 FOR REMAINDER OF OPEN LAND

$$\text{WEIGHTED } I = \frac{1 \times 1078 + 40 \times 10}{1088} = 1.35$$

S : SLOPE MAIN CHANNEL FROM USGS QUADS (CULVER'S & BLAIRSVILLE)

TOTAL L = 6300'

10% = 630' MSL EL 820

85% = 7055' MSL EL 1120

$$\text{SLOPE} = \frac{300'}{6225/5280} = 255'/\text{MI.}$$

$$Q_{100} = (136\,A^{.84})(S^{.26})(St^{-.51})(I^{.14})$$

$$Q_{100} = (136 \times 1.7^{.84})(255)^{.26}(2.6^{-.51})(1.35^{.14})$$

$$Q = 215 \times 4.22 \times 0.61 \times 1.1$$

$$Q = \underline{739\ cfs}$$

BY _____ DATE 1-31-11 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A2 OF A9

CHKD. BY _____ DATE _____ Skellenger Dam PROJECT CC-272

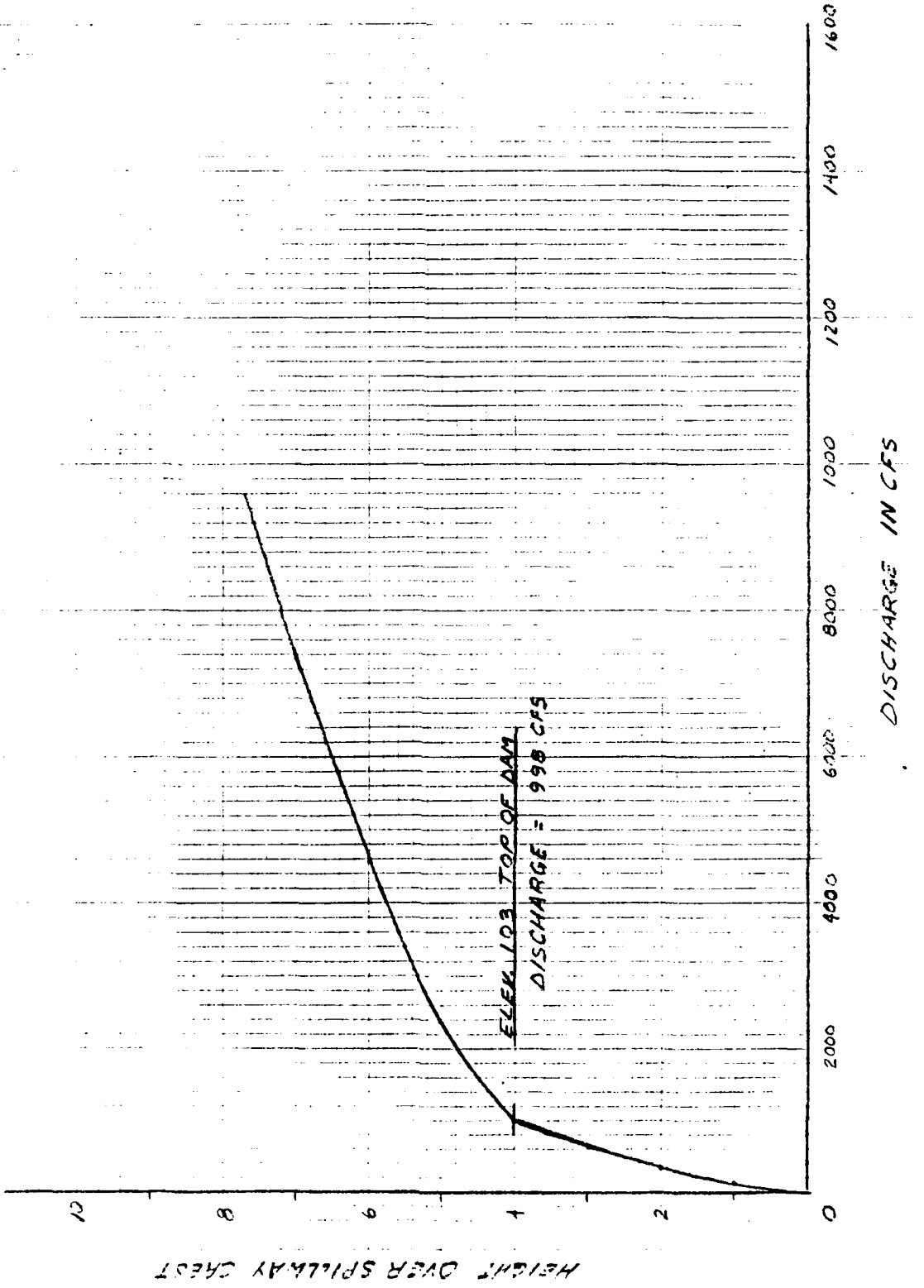
SUBJECT Stage Discharge

Flow over Spillway Crest El. 99* Q = CLH^3/2				Flow over Dam El. 103 - L. 306' Q = CLH^3/2					TAIL WATER EL.
H	L	C	Q	H	C	Q	ΣQ	ELEV.	
0	31'							99	
1	31.7'	3.2	101				101	100	93.5
2	32.3'	3.4	311				311	101	95.5
3	33'	3.6	617				617	102	98.0
4	33.7'	3.7	998	0	2.7		998	103	99.5 **
5	|	|	1,394	1	|	826	2220	104	
	|	|	1,833	2	|	2336	4170	105	
	|	|	2,309	3	|	4292	6602	106	
	↓	↓	2,821	4	↓	6610	9431	107	

** NO ADJUSTMENT TO SPILLWAY FLOW DUE TO DOWNSTREAM BRIDGE TAILWATER IS NECESSARY SINCE THE DEGREE SUBMERGENCE IS NEGLIGIBLE AND DOES NOT REDUCE THE SPILLWAY CAPACITY IN THE RANGE OF FLOW

* Assumed Datum of 99 corresponds approx. with El. 777 NGVD

SKELLINGER DAM
STAGE DISCHARGE CURVE



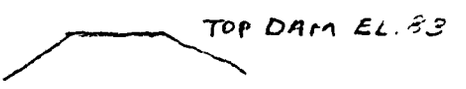
BY SEKOVEC DATE 6/27/91 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A4 OF A9

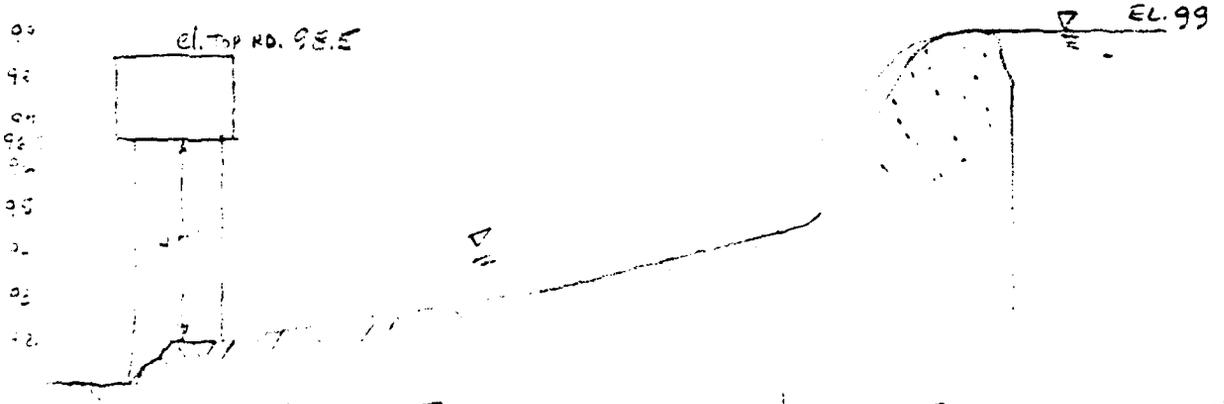
CHKD. BY _____ DATE _____ SKELLINGER LAKE DAM PROJECT CC 296

SUBJECT STAGE DISCHARGE DOWNSTREAM CULVERT — TAILWATER CHECK

FLOW THROUGH SKELLINGER ROAD BRIDGE DOWNSTREAM
USING HYD. ENG. CIRC. NO. 5 (CULVERT FLOW)

B = WIDTH BRIDGE = 15.5'
DEPTH OPENING = 4.7'



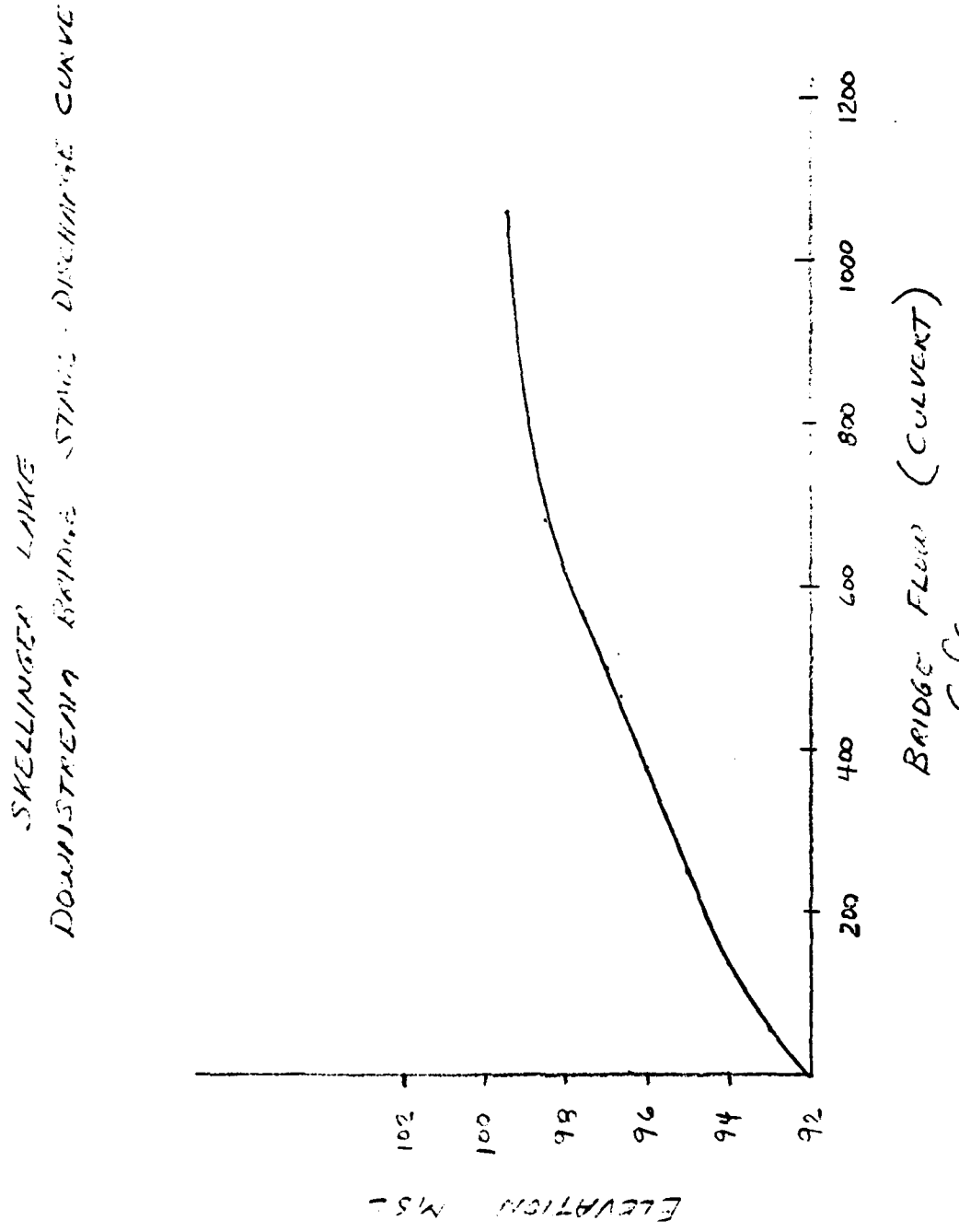


ELEV.	CULVERT FLOW THROUGH BRIDGE d	Hw	Q/B	Q ASSUM. INLET CONTROL	WEIR FLOW OVER BRIDGE C	L	H	Q Q=CLH^3/2	TOTAL FLOW
92	0	0							
93	1	.21	3.5	54					54
94	2	.42	8.5	132					132
95	3	.64	16	248					248
96	4	.85	24	372					372
96.7	4.7	1.0	30	465					465
97	5	1.06	32	496					496
98	6	1.28	40	620					620
98.5	6.5	1.38	44	682					682
99	7	1.5	48	744	2.7	100	.5	96	840
99.5	7.5	1.6	51	790	2.7	100	1.0	270	1060

BY CCRAVOLO DATE 2/27/81 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A5 OF A.1

CHKD. BY _____ DATE _____ SKELLINGER LAKE DAM PROJECT CC 276

SUBJECT DOWNSTREAM BRIDGE STAGE DISCHARGE CURVE



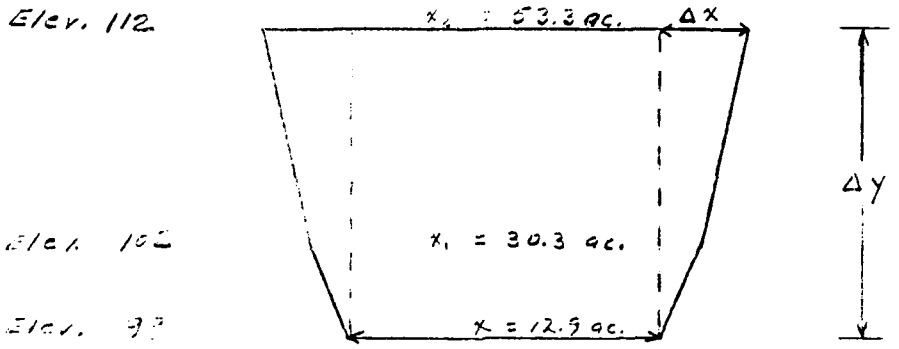
BY _____ DATE 1-9-81 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A-6 OF ___

CHKD. BY _____ DATE _____ Skellinger Dam PROJECT CC-1126

SUBJECT Surcharge Storage

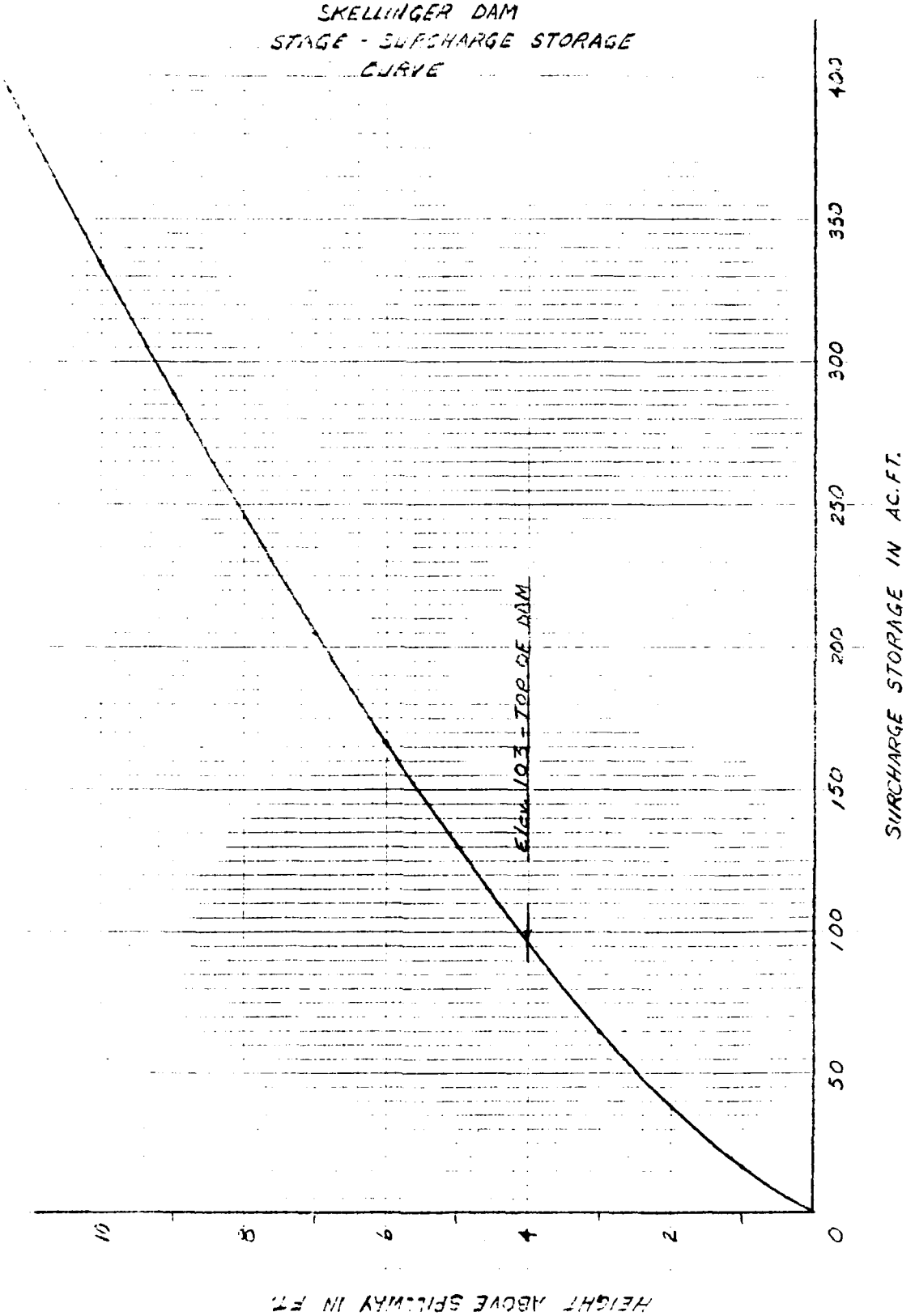
Area of lake @ elev. 99 MSL = 12.9 ac.
Area at 780' contour (100 MSL) = 30.3 ac.
Area at elev. 790' (112 MSL) = 53.3 ac

Δ Surcharge Storage = $\Delta y (x + \frac{1}{2}\Delta x)$



Elev.	Ht. above splwy / 780' (Δy) in ft	($x + \Delta x$) (ac.)	Surcharge Storage (ac. ft) To el 99	Above el 100	Σ SS.
99	0	0			
100	1	15.8	15.8		15.8
101	2	18.7	37.4		37.4
102	3	21.6	64.8		64.8
103	4 / 1	31.5		31.5	96.3
104	5 / 2	32.6		65.2	130.
105	6 / 3	33.8		101.4	166.2
106	7 / 4	34.9		139.6	204.4
107	8 / 5	36.1		180.5	245.3
108	9 / 6	37.2		223.2	288
109	10 / 7	38.4		268.8	333.6
110	11 / 8	39.5		316.0	380.8
111	12 / 9	40.7		366.3	431.1
112	13 / 10	41.8		418.0	482.8

SKELLINGER DAM
STAGE - SURCHARGE STORAGE CURVE



BY _____ DATE 1-9-81

CHKD. BY _____ DATE _____

SUBJECT _____

LOUIS BERGER & ASSOCIATES INC.

Shellhiger Dam

Summary from HEC-1 Input

SHEET NO. A6 OF A11

PROJECT 80-76

Ht. above Splwy. Crest (Ft.)	Surcharge Storage (ac. ft.)	Discharge (cfs)
0	0	0
1	15.8	100
2	37.4	311
3	64.3	617
4	96.3	998
5	133	2,366
6	166.2	4,582
7	204.4	7,360
8	246.3	10,597
9	288	14,234
10	333.6	18,228

BY _____ DATE 1-2-71

CHKD. BY _____ DATE _____

SUBJECT _____

LOUIS BERGER & ASSOCIATES INC.

Skellinger Dam

Drawdown of Lake

SHEET NO. A-9 OF A-12

PROJECT Finch

Drawdown by 24" ø C.M. pipe

Normal pool elev. = 99
Inlet invert elev = 87.5
Exit invert elev. = 87
Total drawdown head = 10' to top of pipe at outlet

Assume inflow of 1 cfs/sq. mi. of D.A. ∴ inflow = 1.7 cfs.

From Dam Application:
Volume of lake = 12 mill. gal. (37.0 ac.ft.)

$Q = CA\sqrt{2gH}$

$C = 0.55$
$A = 3.14$ sq. ft.
$H_{avg.} = 5'$

$Q = 0.55\ (3.1416)\sqrt{2 \times 32.2 \times 5}$ = 31.0 cfs - inflow =

31 cfs - 1.7 cfs = 29.3 cfs

$$\text{Drawdown time} = \frac{37 \times 43{,}560}{29.3 \times 3{,}600} = 15.28 \text{ hrs}$$

Say 16 hrs.